



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/520,935	08/23/2005	Michael Numminen	3670-55	4772
23117 7590 02/12/2007 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203			EXAMINER LIU, HARRY K	
			ART UNIT	PAPER NUMBER
			3662	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		02/12/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/520,935

Applicant(s)

NUMMINEN, MICHAEL

Examiner

Harry Liu

Art Unit

3662

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 1/12/2005
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Robbins et al. (US Patent 5973638)** in view of **Derneryd et al. (US Patent 6351243)**.

Considering **claims 1, 2, 7, 8**, Robbins discloses a smart antenna/antenna array channel simulator and test system for verifying the integrity (**calibrate**) of a smart antenna system by extracting the **temporal (different time intervals)** and **spatial** information of the signals of interest (**main lobe** instead of **grating lobe**) (**Abstract**). The signals that are received on the different elements of the antenna array are combined (**adding the value/sum**)(see **FIG. 8 below**) to form a single output and the signal received over **time** at the different antenna elements of the array are weighted (**column 8, lines 25-27**).

Though Robbins does not specifically disclose the method of saving the radiation diagram at t_1 and t_2 ; switching off one element at a time and keeping the ends remain, it is known for people skilled in the art that **weighting** is a method of combining (**summing**) gain, phase and time interval (for multipath purposes) from all array elements by reducing /turning off some elements based on weight.

Given the teachings of weighting concept, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Robbins' invention by taking radiation diagrams from different time intervals (t_1 and t_2) and turning off (or reducing) one array at a time (which is in between ends falling on side lobes).

Doing so would get an antenna system that is capable of receiving signals more from main lobe instead of side lobes and capable of finding the maximum distance between element without seeing grating lobes.

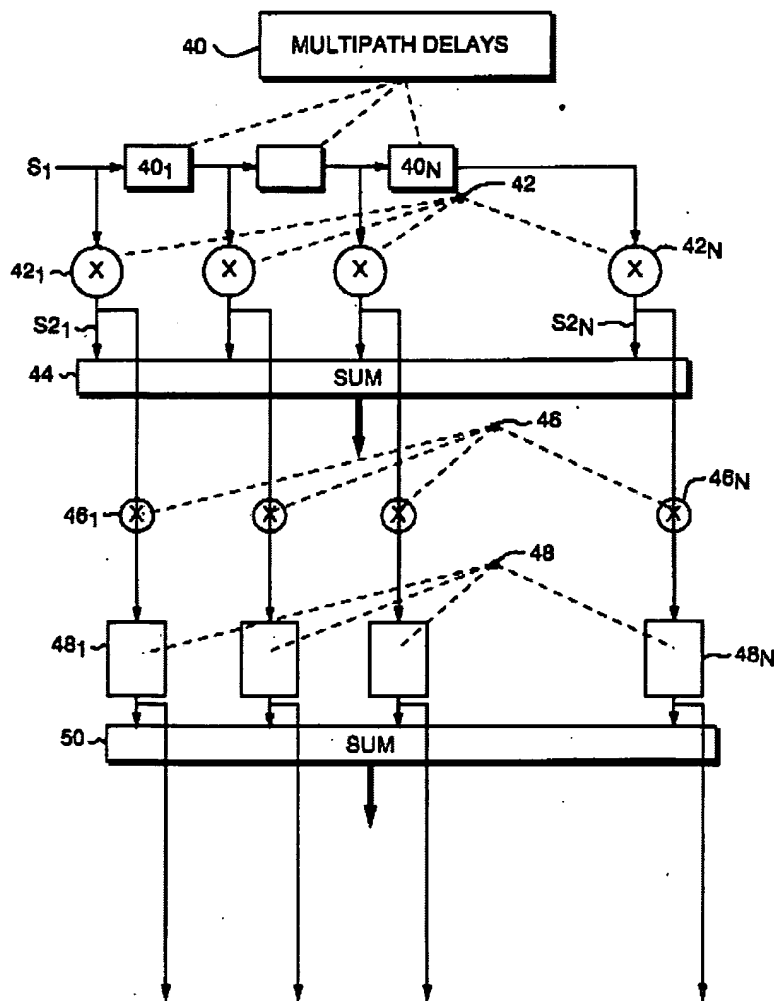
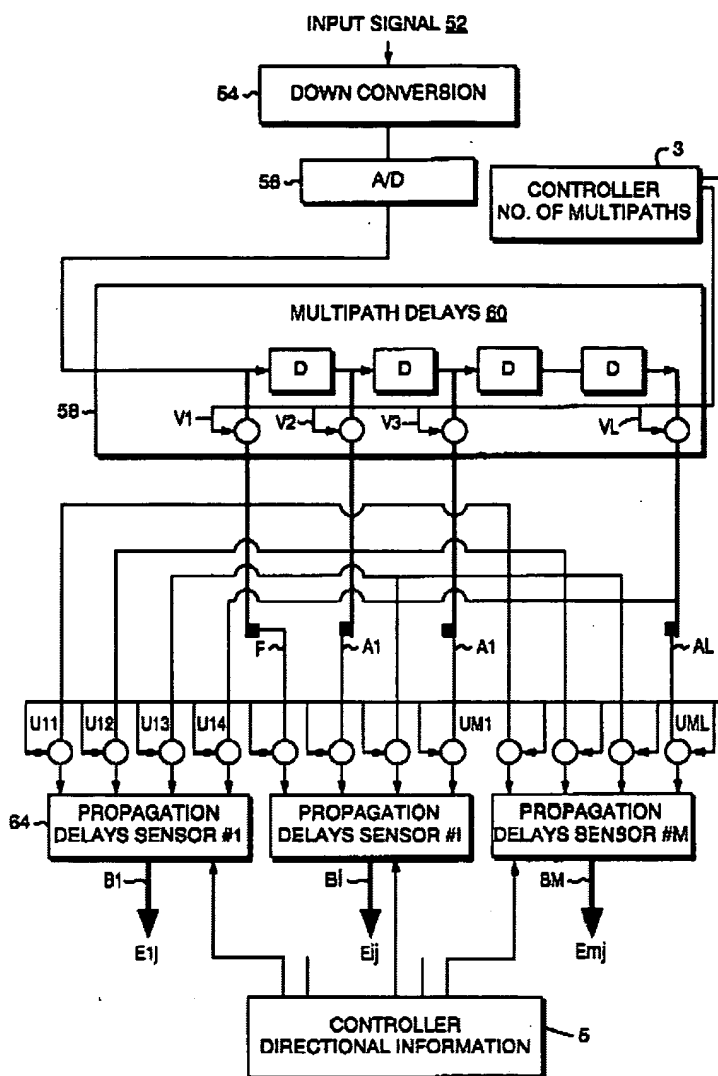


FIG. 8

Considering **claims 3, 4, 9, 10**, Robbins discloses the direction in which the array has maximum response is said to be the beam pointing direction. Thus, this is the direction in which the array has maximum gain (**column 7, lines 15-25**). This is finding the **maximum point** for the corresponding **angle** on main lobe. The A/D converter for converting analog to digital is used (see **Fig. 9A below**) for **converting analog signals to digital signals**.



However, Derneryd teaches a sparse array antenna with sparse element grid in a one-dimensional scanned array or multi-beam array for finding the **distance** between elements in order to generate **no grating lobe (Abstract)**. And the element separation

needs to be reduced to half a wavelength or less to avoid generating grating lobes within visible space (**column 1, lines 28-30**). It is known for people skilled in the art that directional antenna pattern/diagram is always shown with only 180 degrees for the front lobe gain, choosing between $(-\pi/2$ and $\pi/2)$ or (0 to 180 degrees) as angle reference is a common technique.

Given the teachings of Derneryd, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Robbins invention by producing radiation diagram from the value (amplitude) at corresponding angle and the distance between elements with no grating lobe with element distance less than half of wavelength.

Doing so would get an array antenna system that is capable of accurately radiates/receives signals while reducing undesired grating lobes.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references are cited for disclosing related limitations of the applicant's claimed and disclosed invention. **Robbins et al, Derneryd et al.**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Liu whose telephone number is 571-270-1338. The examiner can normally be reached on Monday -Thursday and every other Friday..

Art Unit: 3662

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrell McKinnon can be reached on 571-272-4797. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Harry Liu
Examiner
Art Unit 3662
February 5, 2007



TERRELL L. MCKINNON
SUPERVISORY PATENT EXAMINER